

VISIT...

LANZAROTE
Caliente.COM

5- $XMP \rightarrow GMP$ (It gives NH_2 in number 2).

6-Formation of amino sugars.

7- Aspartate $\rightarrow$ Asparagine (convert)

8-Niacin $\rightarrow$ Niacinamide $\rightarrow$ NAD & NADPH

9 Detoxification of phenyl acetic acid. $\square \square \square \square \square \square$

alpha amino group of glutamine $\square \square \square \square \square$ COOH of phenyl acetic acid

hyperammonemia $\square \square \square \square \square \square \square \square \square \square \square \square$

$\square \square \square \square \square$ phenyl acetic acid $\square \square \square \square \square \square \square \square$ phenyl butyric acid $\square \square \square \square \square \square \square \square$

2 amino groups $\square \square \square \square \square \square \square$ glutamine $\square \square$

$\square \square \square \square$ decarboxylation $\square \square$ 10-glutamate(**excitatory neurotransmitter**)

gamma amino butyric acid

(**Inhibitory neurotransmitter**)

glutamate α $\square \square \square \square \square \square \square \square$ g lutamate $\square \square \square \square \alpha$ -COOH $\square \square$ (CO_2) $\square \square \square \square$ -

.decarboxylase

coenzyme $\square$ PLP(vit.B6) $\square \square \square \square \square$ reaction $\square \square$

$\square$ convulsions $\square \square \square \square \square \square \square$ (PLP)vit B₆ $\square \square \square \square \square \square \square \square \square \square \square \square$.

. inhibitory $\square \square \square \square$ **GABA** $\square \square \square \square \square \square$

2- $\leftarrow \square \square \square \square \square \square \square \square \square \square \square \square$ G glutamate

proline& 1-**Histidine** 3-**ornithine** 4-**arginine**

glutamate group of amino acids $\square \square \square \square \square \square \square \square \square \square \square \square$

(Glutamate). $\square \square \square \square \square \square \square \square \square \square$

$\square \square \square \square \square \square \square \square \square \square \square \square$ 5-**glutamine** 6-**glutathione**

gamma $\square \square \square \square \square \square \square \square$ p roteins the (-) charge $\square \square \square \square$ g lutamate-

.**free** $\square \square \square \square$ **COOH**

peptide bond in proteins $\square \square \square \square \square \square \square \square \square \square \square \square \square \square \square \square$ **alpha** α COOH $\square \square$

COOH group $\square \square \square \square \square \square \square$ gamma COOH group of glutamate $\square \square \square \square \square \square \square$ -

Blood coagulation $\square \square \square \square \square \square$ Ca^{++} $\square \square \square \square \square \square \square \square \square \square \square \square$

- Factors (2,7,9,10) coagulation factors depend on **Vit K** -
 activation of Vit K dependent factors oral
 . **maturation** **carboxylation**
 immature factors Vit K dependent
 .activation to coagulation factors tissue injury
 Vit K mature coagulation
 .protein C,S and osteocalcin factors

: **gamma-carboxyglutamate** binds Ca^{+2} in vit. K dependent proteins,

- osteocalcin and blood coagulation factors (2, 7, 9, 10).

formimino **THF** **formimino group** **FIGLU** **glutamate**
glutamate **proline** **glutamate**.

aldehyde **gamma carboxyl group** reduction
NAD **NADH** **H₂**

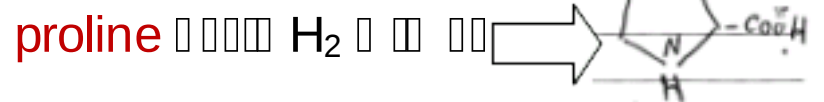
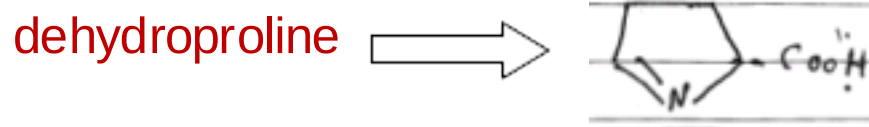
glutamate- **gamma semialdehyde** **acid** **aldehyde**

glutamate reductase **enzyme** **reversible** **irreversible** **dehydrogenase**
substrate **glutamate semialdehyde**
reduction **dehydrogenase**

glutamate semialdehyde

alpha amino group H_2 CHO O H_2O

double bond CHO CH NH_2 N
 dehydroproline cyclization



$\text{NAD} \rightarrow \text{NADH}$

proline proline glutamate

glutamate (reversible)

v Proline

glutamate Non-essential

glutamate gamma semialdehyde glutamate
 dehydroproline then by removal of water and cyclisation
 proline then by reduction

glutamate then by P roline is glucogenic
 alpha ketoglutarate that enters krebs cycle deamination
 then gluconeogenesis finally glucose

Another pathway :

keto group glutamate gamma semialdehyde CHO
 ornithine NH_2 O

ornithine delta aminotransferase enzyme
 delta carbon atom transamination

usually delta transamination alpha

proline glucogenic non essential ornithine

arginine urea cycle ornithine

ornithine, arginine, glucogenic, alpha keto glutarate, glutamate, liver, semi essential, growing child, adult, non glutamate (creatine), arginine, -essential, . α -ketoglutarate

Histidine, proline, Arginine, ornithine, glutamate, alpha keto glutarate, non essential, krebs cycle

Arginine

Semiessential and glucogenic (said before)

arginine, nitric oxide synthase, citrulline, NO, nitric oxide, vasodilator, creatine metabolism, creatine, Arginine, methionine, glycine

Arginine is important for urea cycle

spermidine, spermine, ornithine, Methionine

Proline

glutamate, Non-essential

glucogenic

hydroxyproline ← proline

hydrogen bond formation of triple helix of collagen

collagen, hydroxyproline

proline 10% and) collagen 0% of amino acids
 proline (hydroxyproline 10%
 .
 . codon proline v

collagen hydroxyproline proline

proline prolylhydroxylase enzyme
 collagen proline residu
 .

decollagen Mit. C and Iron (co factors)
 H bond polymerization
 .

Hydroxyl proline C₄ hydroxylation Proline
 CH OH C₄ of proline O₂
 alpha keto glutarate Oxidative decarboxylation
 CO₂ succinate
 Hydroxyproline

Glycine <-- Glyoxylate 1-

Glucose <-- pyruvate 2-

glycine transamination Glyoxylate
 oxalate glycine
 (primary hyperoxaluria)



Lysine à essential amino acid :

.non-essential amino acids, but it is essential for non-essential amino acids

- Essential & ketogenic .

acetoacetic co.A → Pure ketogenic

- Pure ketogenic → 1- Lysine 2- Leucine

positive charge → 1- Lysine

lysyl oxidase → elastin & collagen → 2-

stability → covalent cross links

collagen → 3- Hydroxylysine

lysyl hydroxylase

Histidine

semi-essential amino acid

.glucogenic → Essential amino acid

-Major pathway of histidine catabolism → glutamate

Histidine → deamination → Histidase → NH_3 → NH_2

Alpha carbon → H → beta carbon → double bond between alpha and beta carbon → urocanic acid =(urocanate)

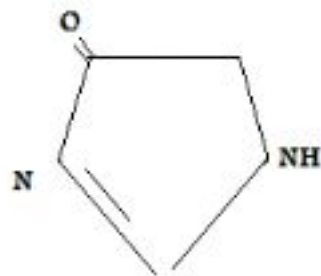
acids → urocanic acid → urocanase

H_2O → urocanase

urcoanate hydratase
 CH₂-CH₂ → CH=CH

CH₂-CH₂ → CH=CH imidazole ring
 double bond O ketone imidazolone

side chain propionate (3C) imidazolone
 propionate



Imidazolone propionate

ring Hydrolase

OH C=O of imidazolone H N ring

THE formimino .N- formiminoglutamate



N-formimino glutamate=figlu

fi=figlu

Glu=glutamate

Formimino tetra hydro folate (FH₄)

.glutamate

enzyme formimino transferase formimino
 formiminoglutamate FH₄

Glutamate glucose so Histidine is (glucogenic)

This pathway is irreversible essential amino acid

essential amino acid

↓↓folic acid , —

Lformimino group NH_2 group NH_3
methenyl FH_4 methyl FH_4 (one carbon unit)

one carbon unit Histidine: glycine(alpha carbon)the other carbon COOH CO_2 glycine cleavage system

Serine serine hydroxymethyl transferase

folic acid ??

macrocytic anemia

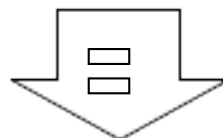
Folic acid or vit. B_{12}

figlu in urine folic acid

formimino glutamate formimino group tetrahydrofolate

tetrahydrofolate FH_4 figlu in urine

.more sensitive Histidine



formimino glutamate

folic acid in the blood

• Histidine → has two abnormalities.

1-Histidinemia → ↓Histidase & ↑ blood histidine .

inncent 0000 0000 00 0000 00 00 00 00 00
 000 0 0 000 0 00 000 0 0000 0000 000 mild mental retardation00
 00 0000

2-Urocanic Aciduria→ ↓Urocanase& ↑Blood urocanate.

Other derivatives of histidine :

1-00 Histidine decarboxylase 0000 Histamine 00 00 CO₂ 000 0 H
 000 0 00 CH 0000 CH₂

Histidine 00 00 000 beta alanine

00 COOH group 0000 alanine 00 00 NH₂ group of histidine 0000
 carnosine 00 0 000 0000 0000 carnosine synthase 0 0000 00 0000 00 00
 00 0000 00 00 0000 00 carnosine 0000 0 00 0000

00 0000 000 00 0000 00 0000 0000 Methyl group 00 SAM 0
 00 00 carnosine 0 0 anserine 00 0 000 0000 0000 methyl transferase

Carnosine and anserine are present in muscles and act as buffers
 for lactic acid

00 000 0000 00 anserine0 carnosine000000 activity of myosine ATPase
 0 000 00 00 000 0 000 0000 00 00 copper

00 00 00 00 0000 0 00 0000 00 00 000000 00 0 0 000 00
 Ergothionene00 0 0000 00 Histidine0 0000 0000 3 methyl groups00 N
 0000 0 0 0 SHgroup0 0000 00 00 ring

00 00 thionene00 00 0000 SH0 0000 00 liver 0 semen 0 Blood cells 0
 000 antioxidant activity (protect against H₂O₂)